DigiClip: A smartpad for instantaneous student assessment in the virtual classroom

Senior Thesis
Presented in partial fulfillment of the requirements for graduation with distinction in
Industrial Design in the undergraduate colleges of The Ohio State University.

by
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ABSTRACT

The abrupt change from in-person to remote education in an effort to reduce the spread of COVID-19 has thrown millions of teachers and families into strenuous and demanding situations during the 2020 school year. Emergency Remote Learning, in comparison to in-person education, is not engaging, cognitively challenging, or appropriate for student assessment. The challenge is to minimize these pain points and allow for teachers to feel connected to their students, even when they are not physically in the same room.

Introducing DigiClip, a smartpad designed for instantaneous student assessment in the virtual classroom. Designed for Kindergarten through 2nd grade students, DigiClip is able to instantly transmit paper writing and multiple choice answers directly to their teacher during live video conferencing lessons. The smartpad incorporates already existing pen-to-paper digital capturing technology and blue-tooth connection to capture and track student progress in real-time. DigiClip's simple design and visual cues allow for an uninterrupted exchange between teacher and student, making it easy for all to use.

Inspired by the creativity and perseverance of so many educators, DigiClip is designed to make the most of these unprecedented times. Blurring the lines between in-person and remote education, DigiClip's mission is to have no student left behind.

TABLE OF CONTENTS

01

MEET THE DESIGNER

My name is Julia Spencer, and I am a designer from Sylvania, Ohio. As I pursue a Bachelor's Degree in Industrial Design with a minor in Business, I have developed a passion for solving complex problems, specifically those related to children, athletics, sustainability, and so much more. I am simply fascinated with the act of creating, especially when it is for the benefit of others.

The result of my senior thesis is a product concept called DigiClip, developed within the context of the COVID-19 pandemic. The following process book will take you through my experience designing a solution for elementary-level students and teachers as they attempt to navigate through the 2020 school year.

A huge thank you goes out to my friends, family, mentors, professors, and all the elementary school superheroes (aka teachers) for their continued support throughout this project.

To learn more, read on!

June 2020

September 2020

November 2020

PROJECT TIMELINE

3.5 MONTHS

AUG/SEPT — *Research and Conjectures*

OCTOBER — *Formative Assessment*

NOVEMBER — *Ideation and Development*

NOVEMBER 24 — *Presentations*

PERSONAL EXPERIENCE

I've seen the frustration that comes with virtual learning first-hand while nannying for a 2nd-grader named Julian this past semester. Over time, I was able to see how unengaging remote learning was for him. Julian was constantly fidgeting with his toys and unmotivated to pay attention to his teacher. I often wondered how frustrated his teacher must feel, as she is unaware of Julian's attention levels, let alone the other thirty kids she is trying to teach from behind a screen. It was from this observation that I was inspired to design within this problematic.

02

WHAT'S THE PROBLEM?

The world of education has been thrown into chaos due to the COVID-19 pandemic, leaving teachers and families in disarray as people strive to give their children the best possible education without risking the spread of the virus. The sudden shift into the virtual classroom this year has brought about many intense challenges.

And the thing is... this situation isn't going anywhere. The remote learning period has been extended in many cities, and even some districts who have started hybrid learning (in-person/virtual combination) are being forced to revert back to fully online due to rising COVID-19 cases in their area.

Emergency remote learning in comparison to in-person education is not engaging, cognitively challenging, or appropriate for student assessment. Teachers feel like they have lost control over their classroom and have trouble keeping track of students' development. The class lacks a sense of structure and young students often take advantage of the freedom that comes with hiding behind a screen.

WHY SHOULD WE CARE?

The issue takes place in the at-home environment, which is drastically different from student to student. Young children will suffer major set-backs in their development compared to traditional education if issues are not addressed.

THE
STAKEHOLDERS

The three main stakeholders who are most directly affected by the issues in this design problematic are the students in grades K-2, their parents, and their teachers. Remote learning doesn't correctly suite young children who require structure and consistency to understand cognitive basics and stay on track. I decided to specifically focus on the interaction between students and their teachers. According to interviews, it's actually the teachers who are struggling the most.

Teachers

Students Grade K-2

Care-takers

Let's focus here!

SECONDARY RESEARCH

In order to gain the fullest possible understanding of the vast problem space, secondary research was organized into four categories. In each category, I expanded my knowledge of the current state of virtual learning, and also attempted to make connections between ideas that were not necessarily directly related to COVID-19.

Focus: I researched the teacher's perspective, the importance of social-emotional learning, reducing fidgeting using an active classroom, and promoting literacy through play.

Science and Tech: I learned about the evolution of technology in the classroom and how AI, augmented reality, and biometric tech can be used in education.

The Arts: I researched the importance of music and color in the classroom as well as ways art is currently being used to provide comfort during troubling times.

Business: I found several examples of successful business models designed to improve early childhood education.

FOCUS: The Learning Environment

Science and Technology: Virtual Learning

The Arts: Virtual Learning

Business: Virtual Learning
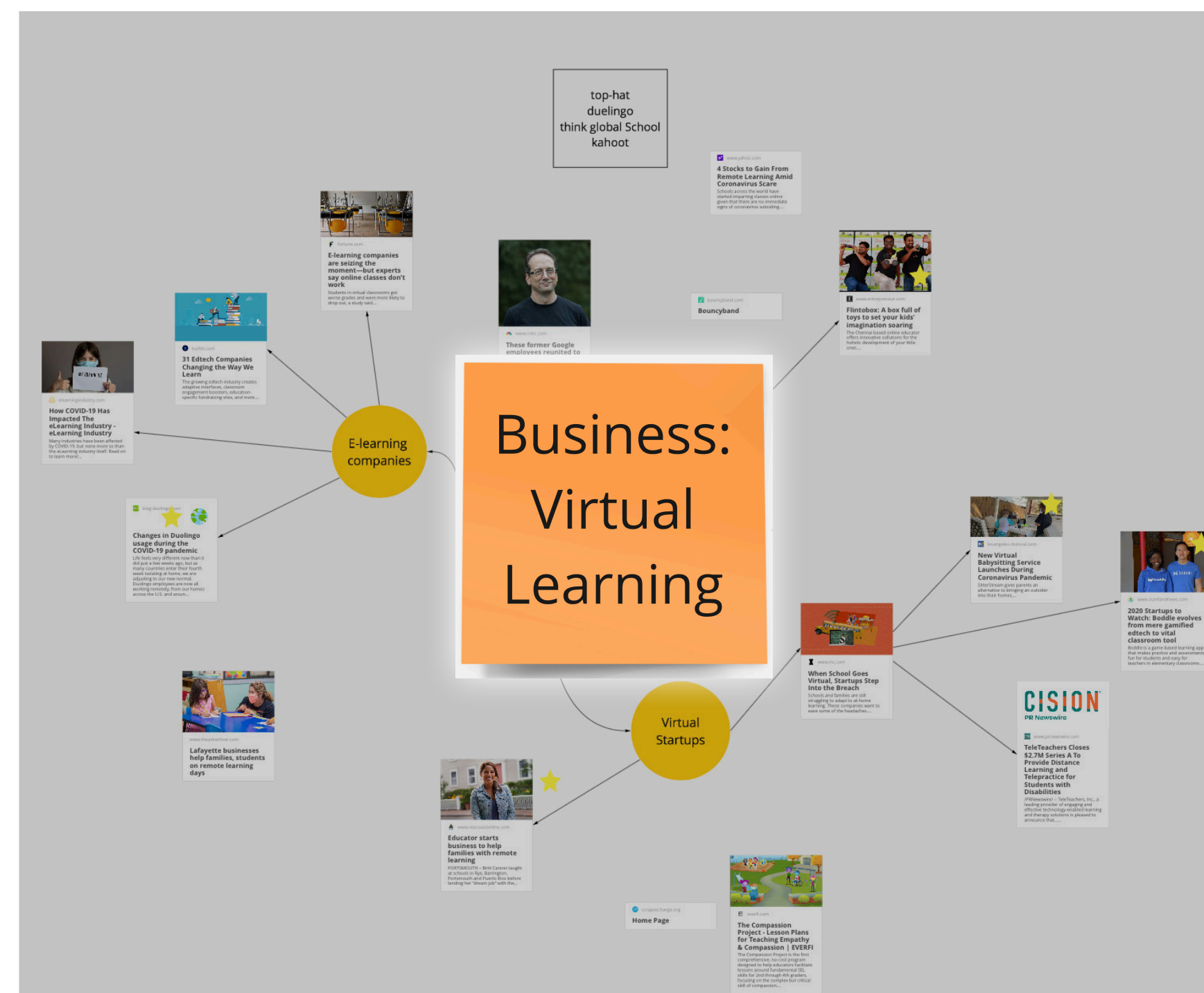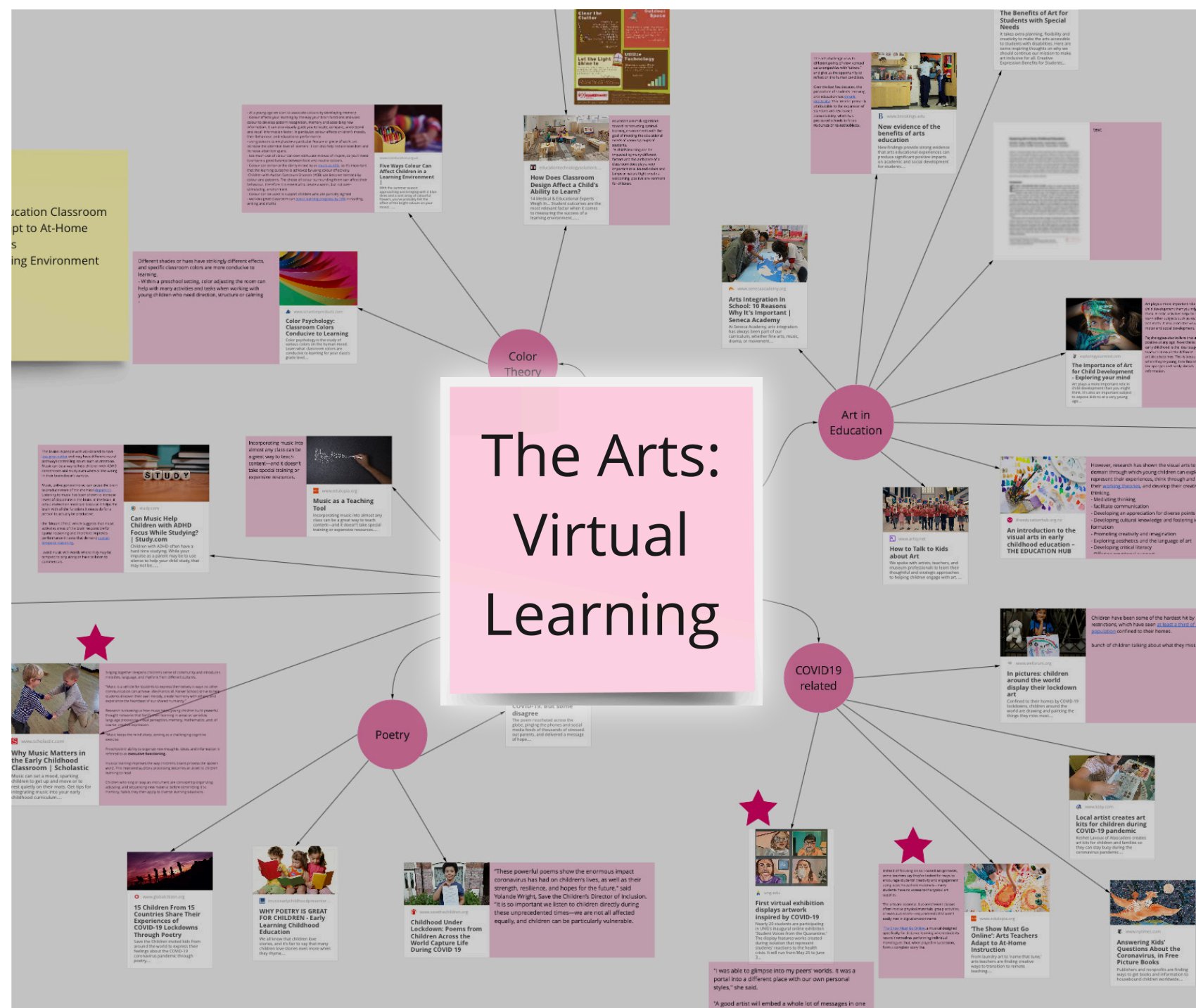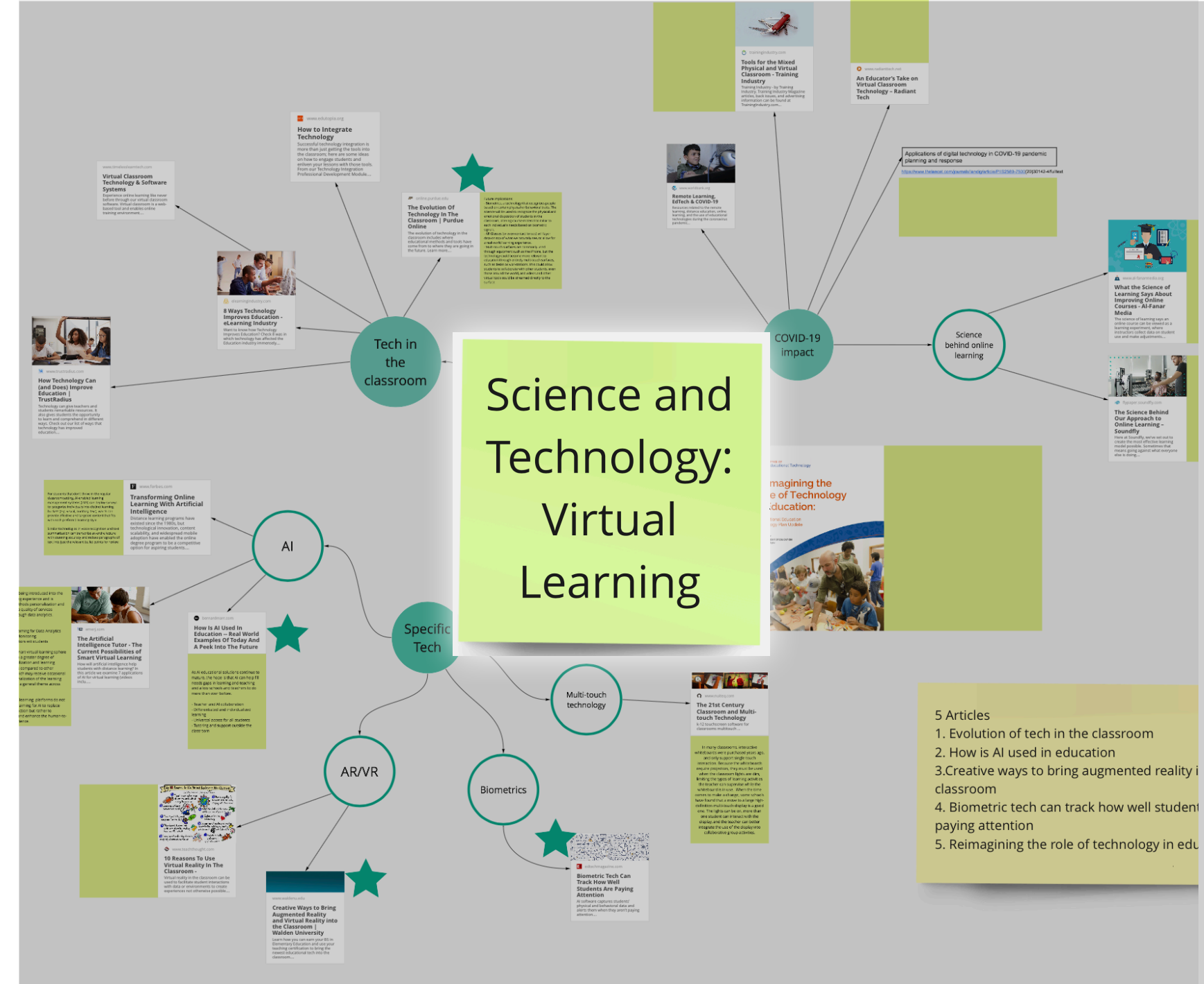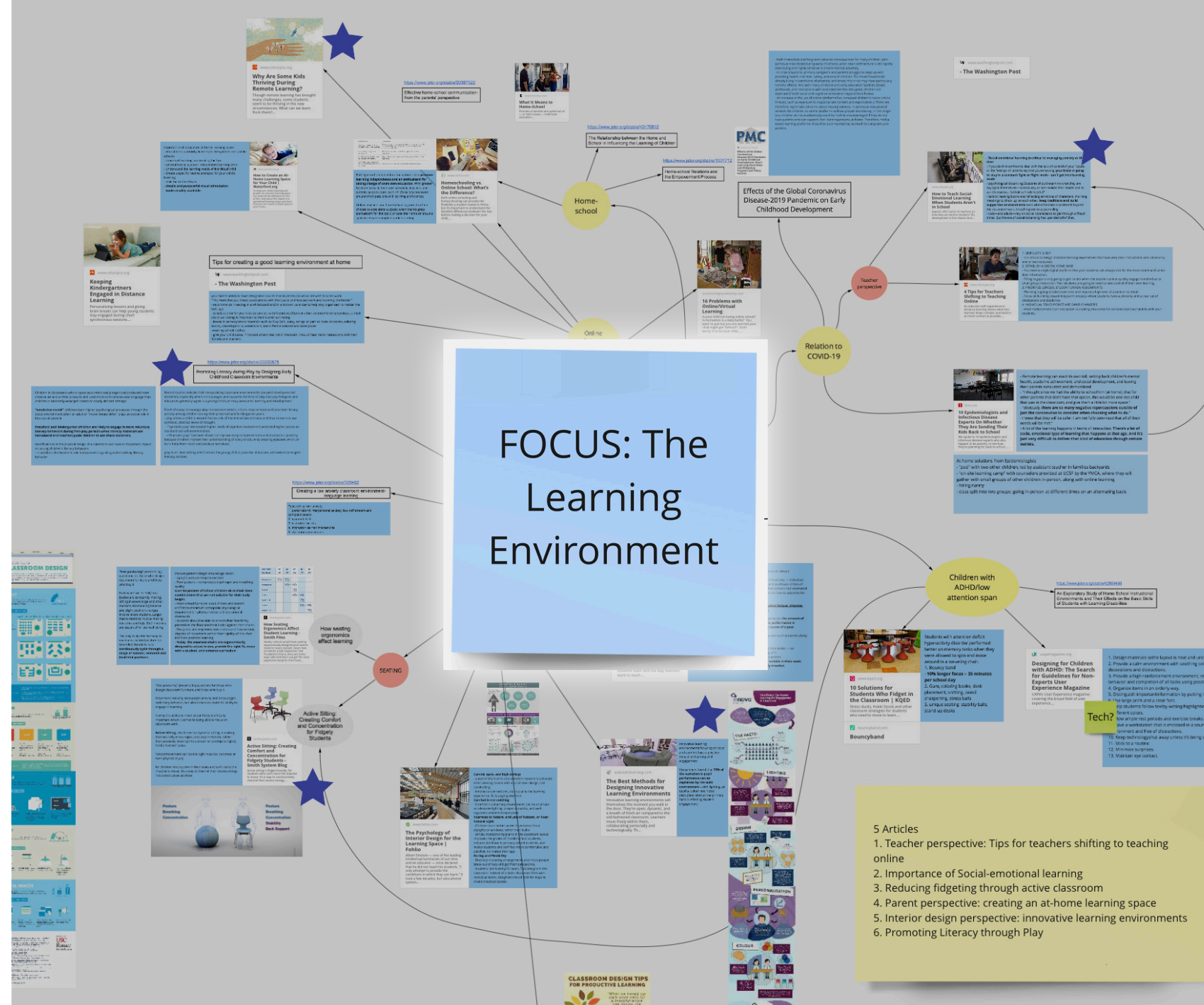
SECONDARY RESEARCH

The following are significant findings and statistics compiled to give a more summarized version of the current virtual learning environment. A note to point out is the lack of resources such as computers, distance learning materials, and access to broadband internet experienced by lower income families. While I cannot tackle the complexity of this problem as a college student, I can choose to make design decisions that consider affordability and accessibility. I can make a product that alleviates stress in one small part of this huge problem.

More about the Virtual Learning Environment

These are notable statistics found through secondary research that help frame the problem of virtual learning during COVID-19.

1.2 billion children in 186 countries have been affected by school closures due to the pandemic.

57.2% of the teachers indicated that at least one-fourth of their students lacked access to broadband internet outside school.

25% of the poorest U.S. students are accessing remote learning as little as once a week or less.

83% of kids in families with an income $100,000 or more are doing distance learning every day, over two hours per day.

Students without access to a computer during remote learning:

High Income Families	1%
Low Income Families	25%

Students in schools who do not offer distance learning materials:

High Income Families	2%
Low Income Families	11%
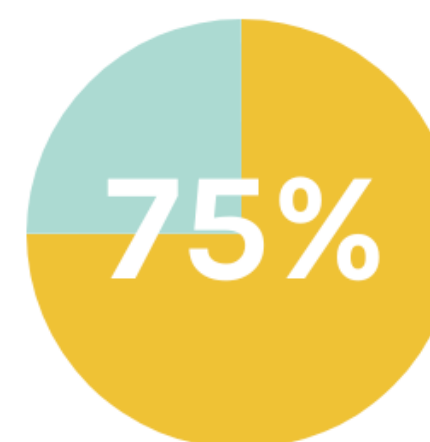
75% of the variation in pupil performance can be explained by the built environment (lighting, air quality, color of room)

Young children, who are easily distracted, are most vulnerable because they rely on structured classroom environments.

DESIGN CONJECTURES

These design conjectures were informed by the secondary research I conducted. They were used to explore initial concepts and ideas to understand what and where I was missing information. Some were reviewed by experts as a form of rapid ideation and further research.

SENSORIAL LEARNING TOOLKIT

SMART WORK STATION

ART INSTALLATION

SUSTAINABLE SUPPLIES
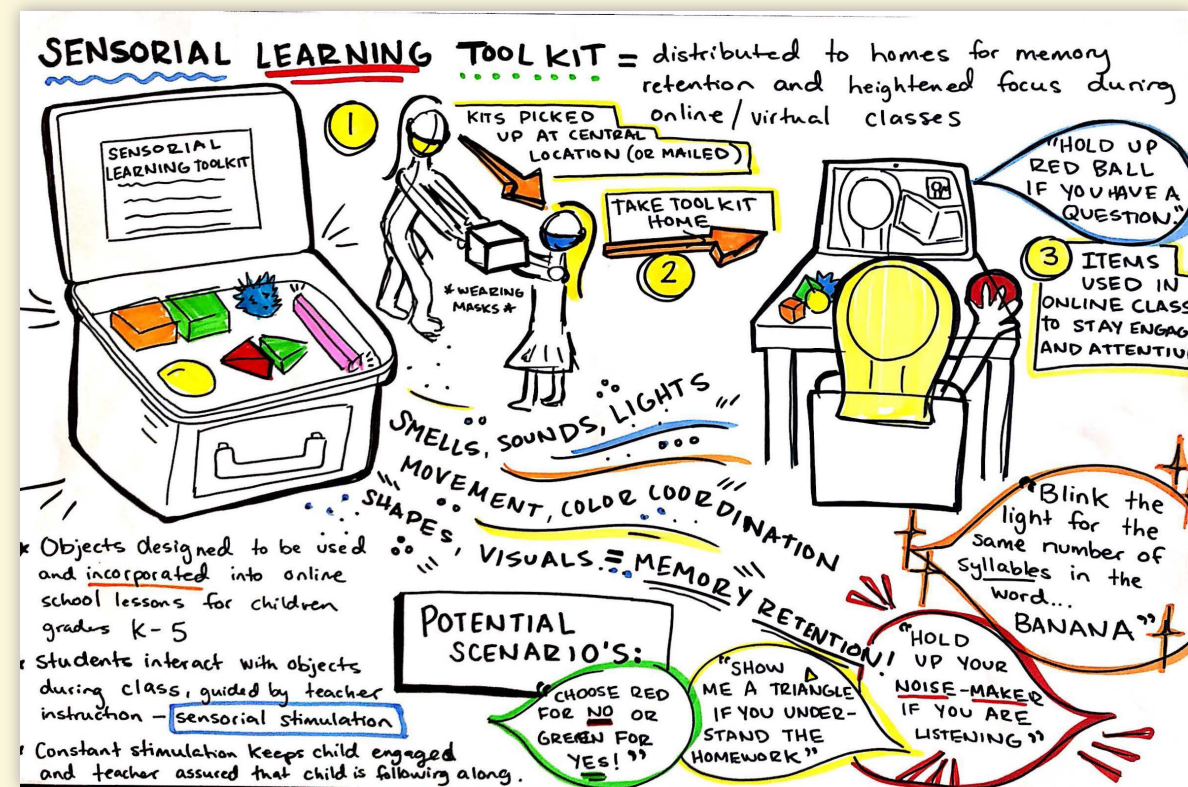
Strengths
+ Improves participation and engagement

Weaknesses
- Not useful when virtual learning ends
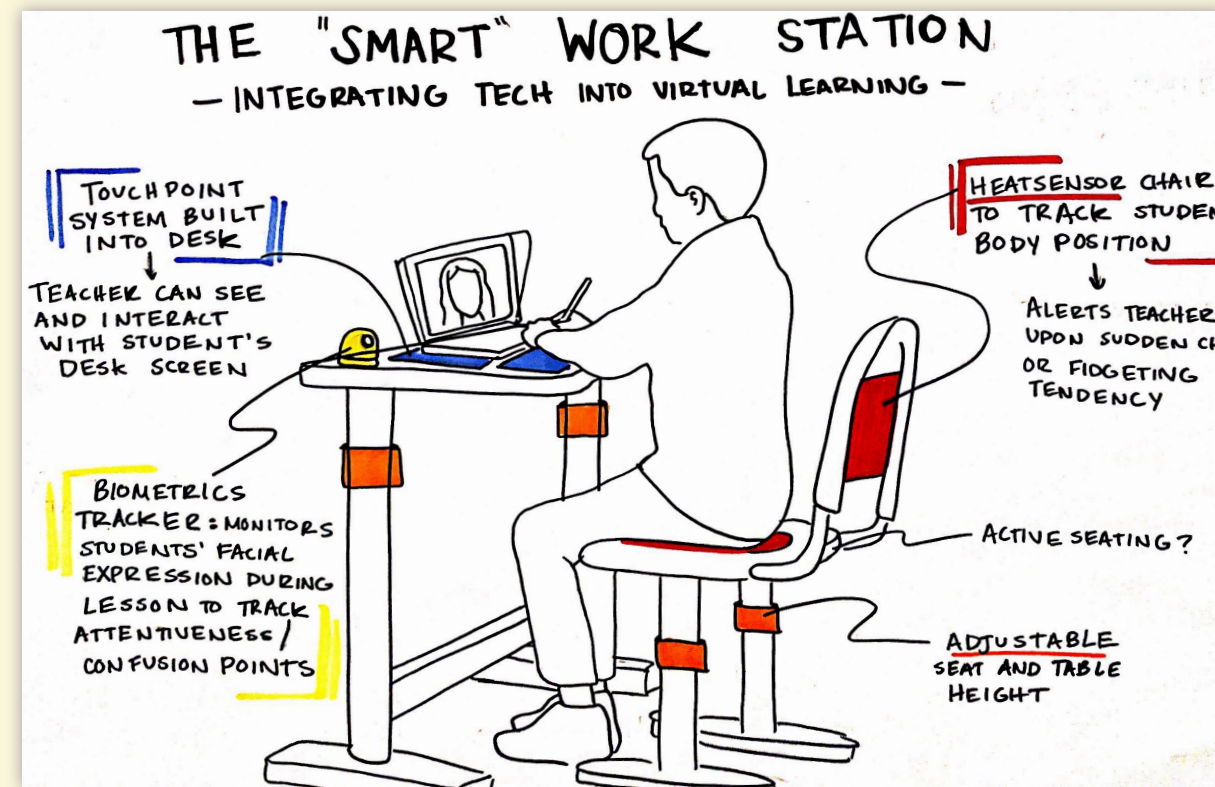
Strengths
+ Give teacher more insight
+ Imitates in-person environment

Weaknesses
- Not accessible
- Not affordable
- Steep learning curve

Strengths
+ Facilitates socialization
+ Purpose after pandemic

Weaknesses
- Dependent on school
- Not universal

Strengths
+ Equalizes home learning environments
+ Eco-efficient system

Weaknesses
- Does not address teachers' main problems

TEACHER INTERVIEWS

Six 30-minute interviews

Disorganization | Student Morale | Stress/ negativity | Relationships with students | Community pushback | Tech issues | Poverty | Double the work | Unproductive class time | No way to assess students | Niche problems

"The kids are resilient, they're rolling with the punches...
As for the teachers...I've never seen morale as bad as its been."
- 3rd grade teacher in Columbus City Schools

Unproductive Class Time

. Lack of focus
. No authority
. Difficulty assessing progress
. Unfinished work

"It's obviously not the same educational experience for the kids."

- 5th grade teacher in Gahanna Jefferson School District

Double the Work

"It's unbelievable the amount of extra work I have put into reworking my lesson plans for online and in-person classes."

- 2nd grade teacher in Sylvania City Schools

Lacking Social Interaction

"I became a teacher because I wanted to build relationships with these kids, not just to send them videos and assignments over the computer."

- 1st grade teacher in Dublin City Schools

Stress and Negativity

"I've been through the wringer with all this change."

"Yesterday was the first day I didn't cry in weeks."

"It almost makes us hate our jobs... there's not a lot of positives, honestly."

- 3rd grade teacher in Columbus City Schools

Morale is high for the kids, they just want to be there

Small groups in hybrid schooling makes class feel more like a family

Parents and teachers are more bothered than the children

Scares me to think about what the future looks like

but every teacher is stressed, overworked, and confused

I hope it doesn't become the norm

There's a disconnect between and the children

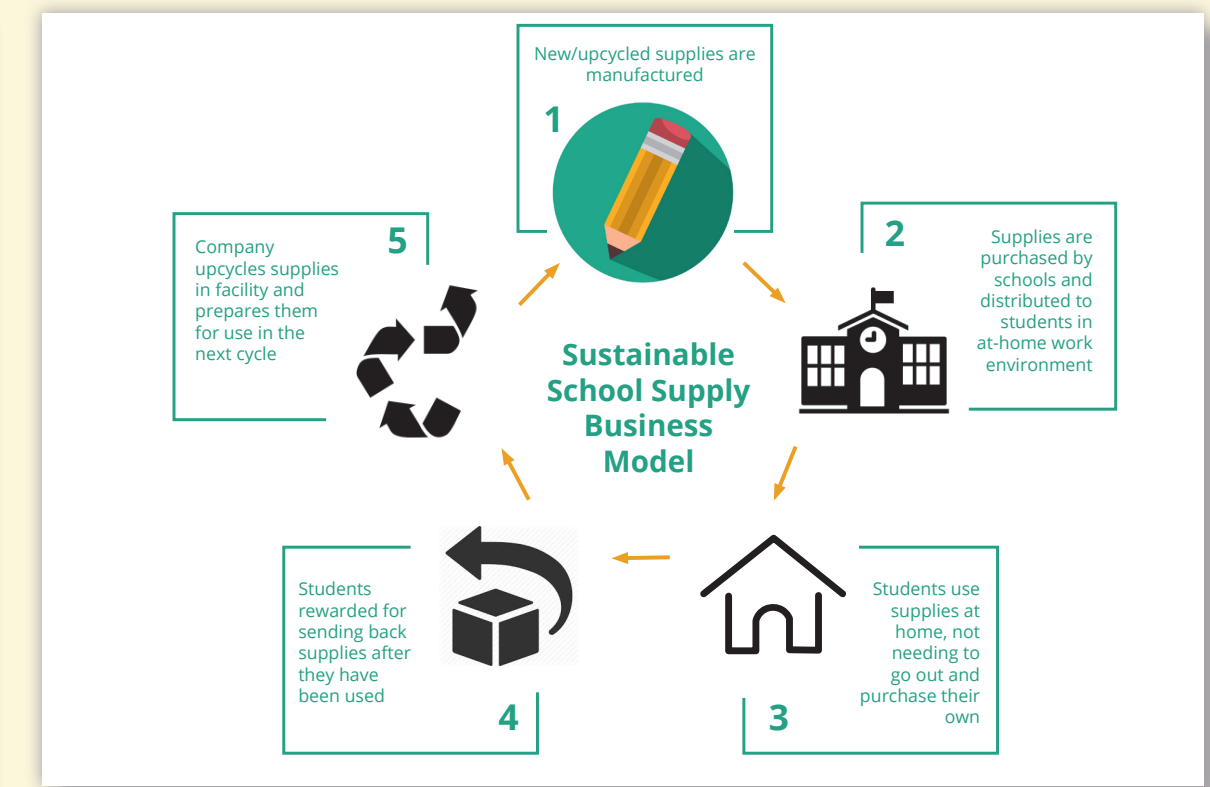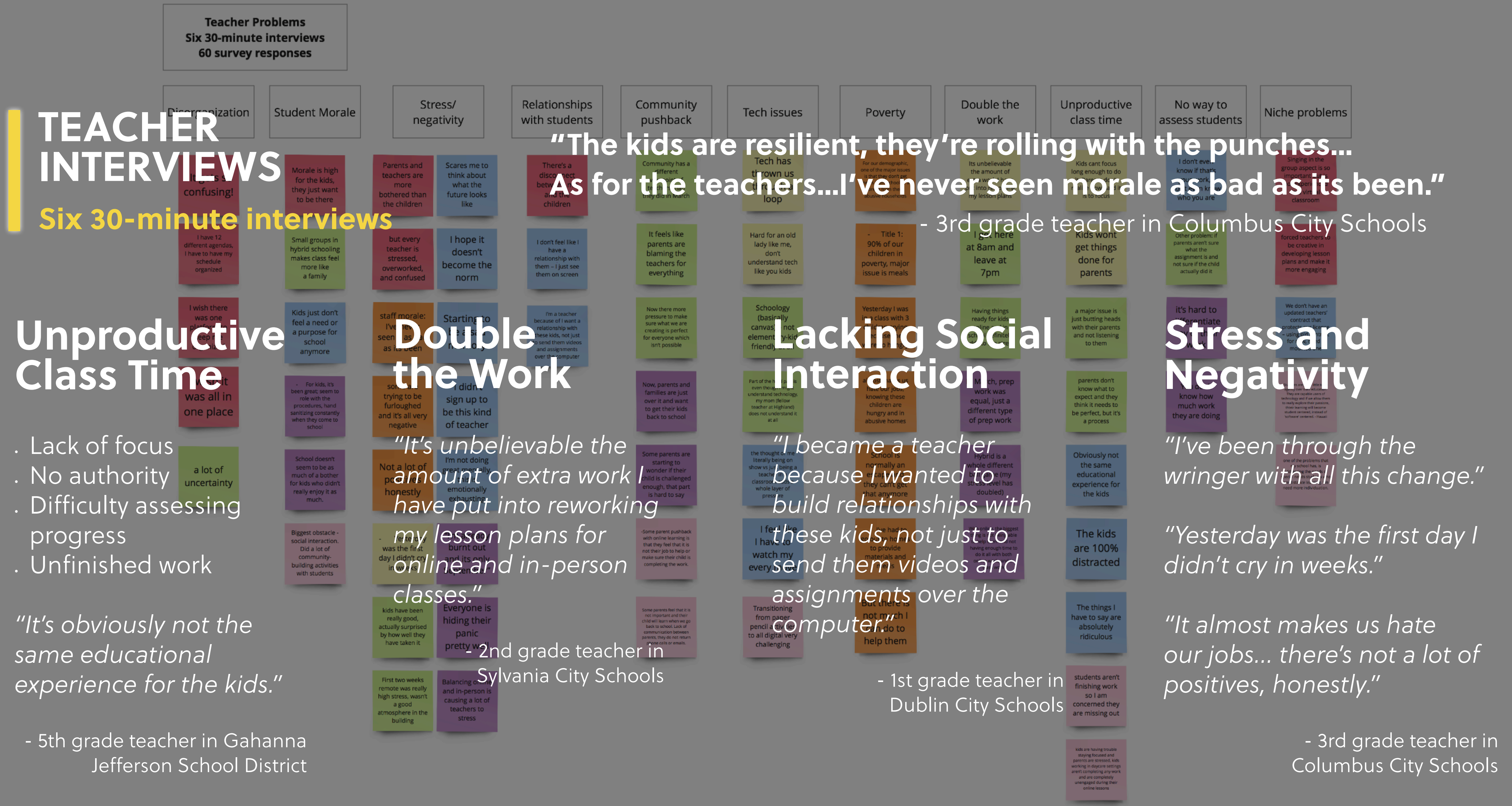I don't feel like I have a relationship with them – I just see them on screen

Community has a different they did in march

It feels like parents are blaming the teachers for everything

Tech has thrown us loop

Hard for an old lady like me, don't understand tech like you kids

For our demographic, one of the major issues

- Title 1: 90% of our children in poverty, major issue is meals

Its unbelievable the amount of my lesson plans

I get here at 8am and leave at 7pm

Kids cant focus long enough to do

Kids wont get things done for parents

I don't even know if that who you are

Singing in the group aspect is so classroom

Other problem: if parents aren't sure what the assignment is and not sure if the child actually did it

forced teachers to developing lesson plans and make it more engaging

I have 12 different agendas, I have to have my schedule organized

I wish there was one

was all in one place

Kids just don't feel a need or a purpose for school anymore

- For kids, it's been great; seem to role with the procedures, hand sanitizing constantly when they come to school

School doesn't seem to be as much of a bother for kids who didn't really enjoy it as much.

staff morale: I've seen as as its been

Starting to

I didn't sign up to be this kind of teacher

I'm not doing great mentally emotionally exhausted

Not a lot of honestly

was the first day I didn't in

burnt out and its only

I'm a teacher because of I want a relationship with these kids, not just to send them videos and assignments over the computer

Now there more pressure to make sure what we are creating is perfect for everyone which isn't possible

Now, parents and families are just over it and want to get their kids back to school

Some parents are starting to wonder if their child is challenged enough, that part is hard to say

-Some parent pushback with online learning is that they feel that it is not their job to help or make sure their child is completing the work.

Schoology (basically canvas), not elementary-kid friendly

Part of the I even though understand technology, my mom (fellow teacher at Highland) does not understand it at all

School is normally an social the classroom whole layer of pres

Hybrid is a whole different (my grade level has doubled)

Yesterday I was class with 3

Having things ready for kids online

Much, prep work was equal, just a different type of prep work

a major issue is just butting heads with their parents and not listening to them

parents don't know what to expect and they think it needs to be perfect, but it's a process

it's hard to differentiate

know how much work they are doing

We don't have an updated teachers' contract that for

know how much work they are doing

a lot of uncertainty

Biggest obstacle - social interaction. Did a lot of community-building activities with students

kids have been really good, actually surprised by how well they have taken it

Everyone is hiding their panic pretty well

First two weeks remote was really high stress, wasn't a good atmosphere in the building

Balancing and in-person is causing a lot of teachers to stress

Transitioning from paper pencil to all digital very challenging

I feel like I have to watch my every

But there is not much I do to help them

Obviously not the same educational experience for the kids

The kids are 100% distracted

The things I have to say are absolutely ridiculous

students aren't finishing work so I am concerned they are missing out

kids are having trouble staying focused and parents are stressed, kids working in daycare settings aren't completing any work and are completely unengaged during their online lessons

SURVEY
RESULTS

48 teachers surveyed

47.9%
Currently teach fully online classes

31.3%
Hybrid model - alternating days of the week
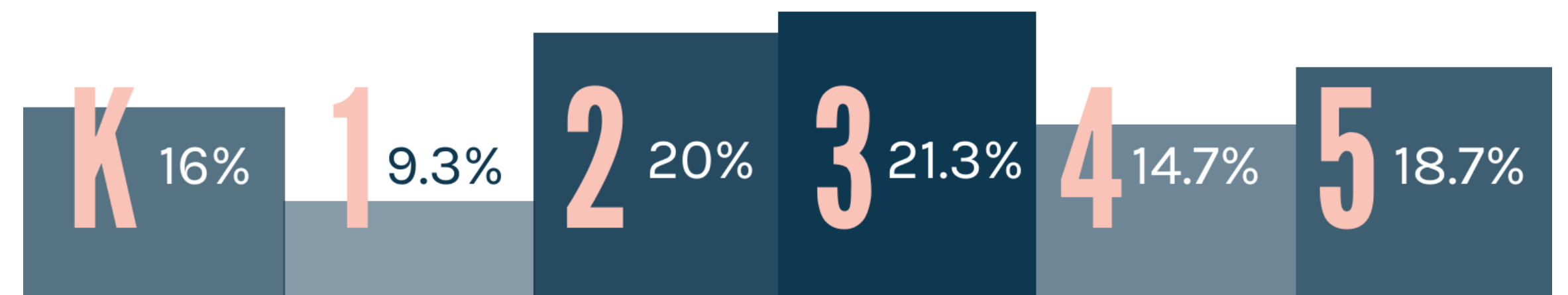
10.4%
Hybrid Model (alternating time of day)

48 elementary school teachers participated in a survey about challenges they face teaching remotely as a result of the COVID-19 pandemic

93.8%
of participants have **never** taught online before pandemic

Participant Statistics

Grade Level
many teachers work with multiple grades

K 16%

1 9.3%

2 20%

3 21.3%

4 14.7%

5 18.7%

Community Setting

Rural
6.2%

Suburban
62.5%

Urban
31.3%

While the majority of teachers work in a suburban setting, the opinions of teachers in urban schools will be equally accounted for.

SURVEY RESULTS

48 teachers surveyed

Participants were asked to rank problems based on how relevant they are to their virtual teaching experience.

0 = Not relevant problem
1 = Slight Problem
2 = Fairly large problem
3 = Extreme Problem

Individual scores for each problem were added up to rank them from most to least relevant overall

Teacher Challenges

Total Problem Severity Score
(summary of teachers individual scores)

Challenge	Score
Adapting teaching methods to virtual	90
Difficulty encouraging participation	78
Keeping up with student progress	73
Difficulty communicating	60
At home distraction	55
Community push-back	42

"Other" Notable Challenges

These were problems specifically brought up by participants and were not already built into the survey.

- Learning new online platforms
- Stress and burnout
- Adjusting to shift from online to hybrid
- Work/life balance
- Taking attendence
- Taking assessments
- Parents going the work for the kids
- Headaches from screen time
- Taking a long time to plan lessons
- Getting materials to students
- Finding age-appropriate apps
- Not tech savvy

Student Challenges (from the Teacher's Perspective)

Total Problem Severity Score
(summary of teachers individual scores)

Challenge	Score
Lack of social interaction with peers	106
Unfinished Work	94
Home Distractions	90
Staying focused	85
Lack of materials	77
Difficulty communicating	70
Lower attendance	67
Lack of mentorship	51

"Other" Notable Challenges

These were problems specifically brought up by participants and were not already built into the survey.

- Parent frustration
- Low social-emotional health
- Language barriers
- Homelessness/ lack of resources
- Inconsistant internet
- Lack of school meals
- Distraction by fear of getting sick
- Technology Fatigue
- Lack of physical activity/boredom
- Inability to follow directions
- Difficulty giving feedback on work

THE NARROWED DIRECTION

After analyzing the information I gathered from both primary and secondary research, I narrowed down on three main issues, or points of intervention, that I could realistically tackle within my senior thesis.

In addition, I decided I wanted keep the interaction between teachers and students at the forefront of my design decisions. From their perspective, it is the teachers that need help the most.

Remote learning is...
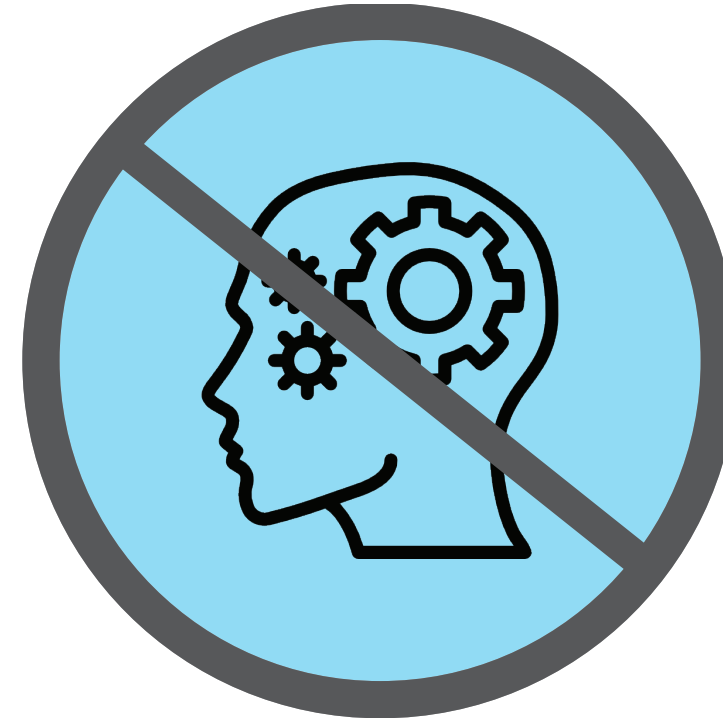
Not cognitively demanding

Not suitable for student assessment

Not engaging

THE BIG QUESTION:

*How can I use design to **help teachers** help their students excel in the remote learning environment?*

DESIGN BRIEF

PROBLEM STATEMENT

Many elementary school teachers feel helpless in their attempts to give students the best possible education during the COVID-19 pandemic. Emergency remote learning in comparison to in-person education is not engaging, cognitively challenging, or appropriate for student assessment. The challenge is to minimize these pain points and allow teachers to feel connected to their students again.

Elementary school teachers will be able to facilitate more productive class time during emergency remote learning with the help of an at-home educational tool that engages students in video classes and allows teachers to track student progress real-time.

GENERAL OBJECTIVES

- Empower teachers to feel in control of their classroom again (both virtually and in-person)
- Be an example of how design thinking can intervene into education in the future
- Increase teacher morale and reduce stress

SPECIFIC OBJECTIVES

- Create a means for children to stay engaged and attentive in virtual class
- Allow for formative assessment to find gaps in students knowledge
- Utilize affordable and accessible methods so the solution is replicable in many types of communities

DESIGN STRATEGIES

Approaches

- Product: A playful at-home interaction tool designed to keep students engaged in lesson and teachers aware of student progress

Features (Must be...)

- Accessible
- Easy to interact with
- Considers life after the pandemic
- Cognitively demanding

Attributes (It will...)

- Foster interaction
- Not distract from lesson
- Encourage engagement
- Work in tandem with any video conferencing system

DEVELOPMENT

03

EVALUATIVE INTERVIEWS

MARKET RESEARCH

USER TESTING

MOOD BOARD

IDEATION SKETCHING

REFINED SKETCHING

PEN IDEATION SKETCHING

EVALUATIVE
INTERVIEWS FOUR 30-MINUTE INTERVIEWS

WHY ANOTHER ROUND OF INTERVIEWS?

After initial research helped narrow my direction to an at-home assessment tool, I wanted to ask teachers more specific questions. My priorities were to validate my design direction and learn what would make my product worthy of being apart of a teacher's time, which should not be wasted.

IMPORTANT TAKE-AWAYS

- "My main issue with assessment is not having everyone participate at the same time on the same question."
- "The ability to see their drawing or writing from home would be very valuable"
- "Seeing their writing would be very beneficial"
- "Writing responses would be higher level thinking while multiple choice could give me comparable data."
- "It would be nice to use the buttons for just two options, like 'True or False' questions."
- "I want kids to get that tactile pencil/paper feeling back."
- "Please keep them on paper-pencil! Don't put them on screens. It makes them better writers."
- "If I could just have everything on one tab... I don't want to toggle between two screens."
- "The more basic, the better. They're fine motor skills are still developing."
- "Lighting up is great for visual cue of when it's time to respond on device."

METHODOLOGY

Semi-structured phone interview with 3 teachers who have experienced remote teaching. The teachers were asked to predict their students' abilities to utilize an at-home educational tool and describe the ideal product in their opinion.

DESIGN LESSONS

Writing capabilities
Include ability for student to hand-write responses
Encourages higher level thinking
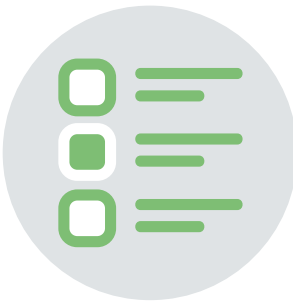
Multiple choice capabilities
Incorporate buttons for multiple choice response
Provides comparable data

Paper/pencil writing
Make the act of writing as traditional as possible
Avoid writing on digital screens

Simple and easy to use
Be conscious of child's limited motor skills
Use light as a visual cue for response moments

MARKET RESEARCH

Exploring existing digital clipboard technology

When the teachers overwhelmingly said they wanted to see student hand-writing in the virtual classroom, I did market research exploring existing digital clipboard technology. I used the keywords "digital clipboard" because I envisioned the value of a teacher being able to see a student's handwriting real-time.

There are many that allow for digital file transmission but lack affordability or are not kid-friendly. And vice versa. I wanted my project to encompass all those qualities. Another point worth mentioning is that I am taking from the already existing technology of touch sensitive drawing pads. This drives down the research and production costs that an otherwise completely new technology would have to consider. It would be less expensive and more accessible to many types of school districts.

	reMarkable 2 "The next generation paper tablet"	Wacom Bamboo Slate "Pen-to-paper digital capturing tool"	Boogie Boards Electronic Writing Tablets	Wacom PHU-11 Digital Clipboard "Instant Digitization"
Digital File Transmission	✓	✓		✓
Tactile/Paper Feel	✓	✓		
Affordability			✓	
Kid-Friendly			✓	

	Osmo Creative Game Kit for iPad	VTech Write and Learn Creative Center	Ohuhu Electronic Drawing Board	DigiClip Remote Learning Assessment Tool
Digital File Transmission				✓
Tactile/Paper Feel	✓			✓
Affordability		✓	✓	✓
Kid-Friendly	✓	✓	✓	✓

USER
TESTING

METHODOLOGY

User testing/co-design with 1 student in 2nd grade who has experienced remote learning. The student was asked to answer questions using different physical prototypes and compare them in terms of enjoyment. Observations were made as to which form led to the most efficient answering of questions.

DESIGN LESSONS

I found that flat buttons are ideal as opposed to 3D buttons because they lead to lowest distraction, are less toy-like, and led to the quicker response times.

CREATING THE IDEAL DEVICE

The student was asked to create what his ideal device would look like. His priority was to use fun shapes and bright colors as buttons.
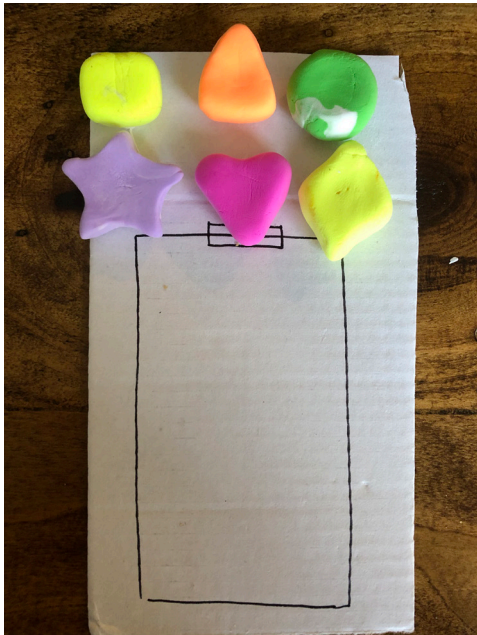
Questions asked on iPad to mimic remote class

Flat button multiple choice layout

Writing to mimic digital clipboard

3D button multiple choice layout

3D Buttons

+ Most enjoyable
− High distraction
− Easy to lose

Flat Buttons

+ Low distraction
+ Quick response
− Not as enjoyable

Writing Response

+ Low distraction
+ Higher level thinking
− Least entertaining

MOOD
BOARD

Some descriptive words I kept in mind when searching for inspiration in terms of color and form were:

Welcoming
Friendly
Home-y
Inviting
Functional
Productive
Focus
Kid-friendly
Comfortable
Rounded
Simple
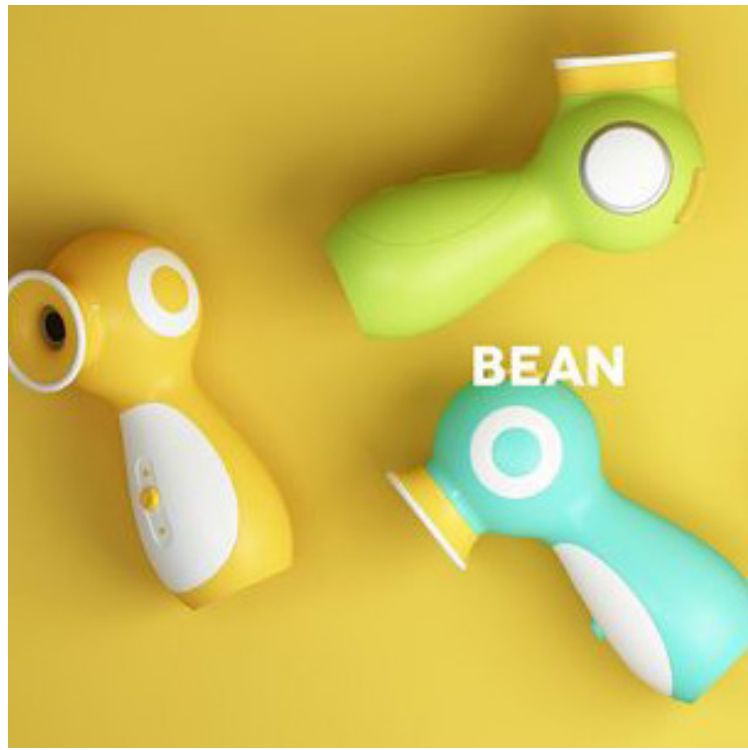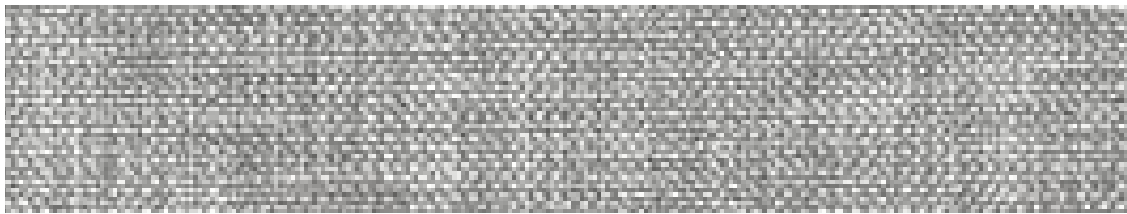
IDEATION
SKETCHING

Then, I went into ideation sketching, designing a device inspired by digital clipboards with both writing and multiple choice capabilities. I realized early-on that the multiple choice buttons should be placed on the top to consider both right and left-handed users. I was also informed that a flat board, parallel with the desk, would work most naturally for a child practicing handwriting, as that is normally the position in which they will write.

clip

Multiple choice buttons

speaker

Pen holder

KICKS OUT

FLAT

buttons

any piece of paper

sensor pad

ANGLED

DIGITAL SKETCHING

Curved buttons
over top edge
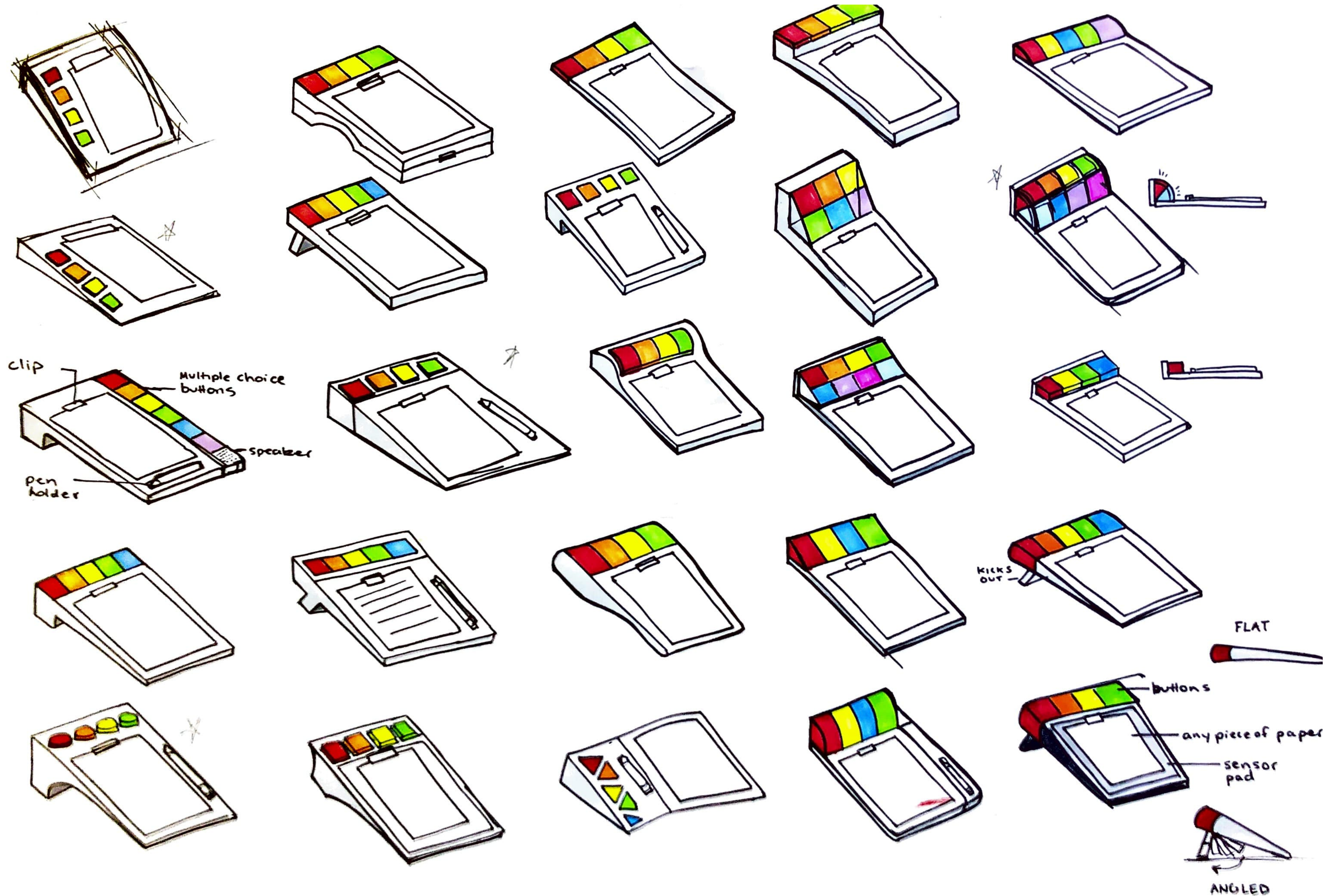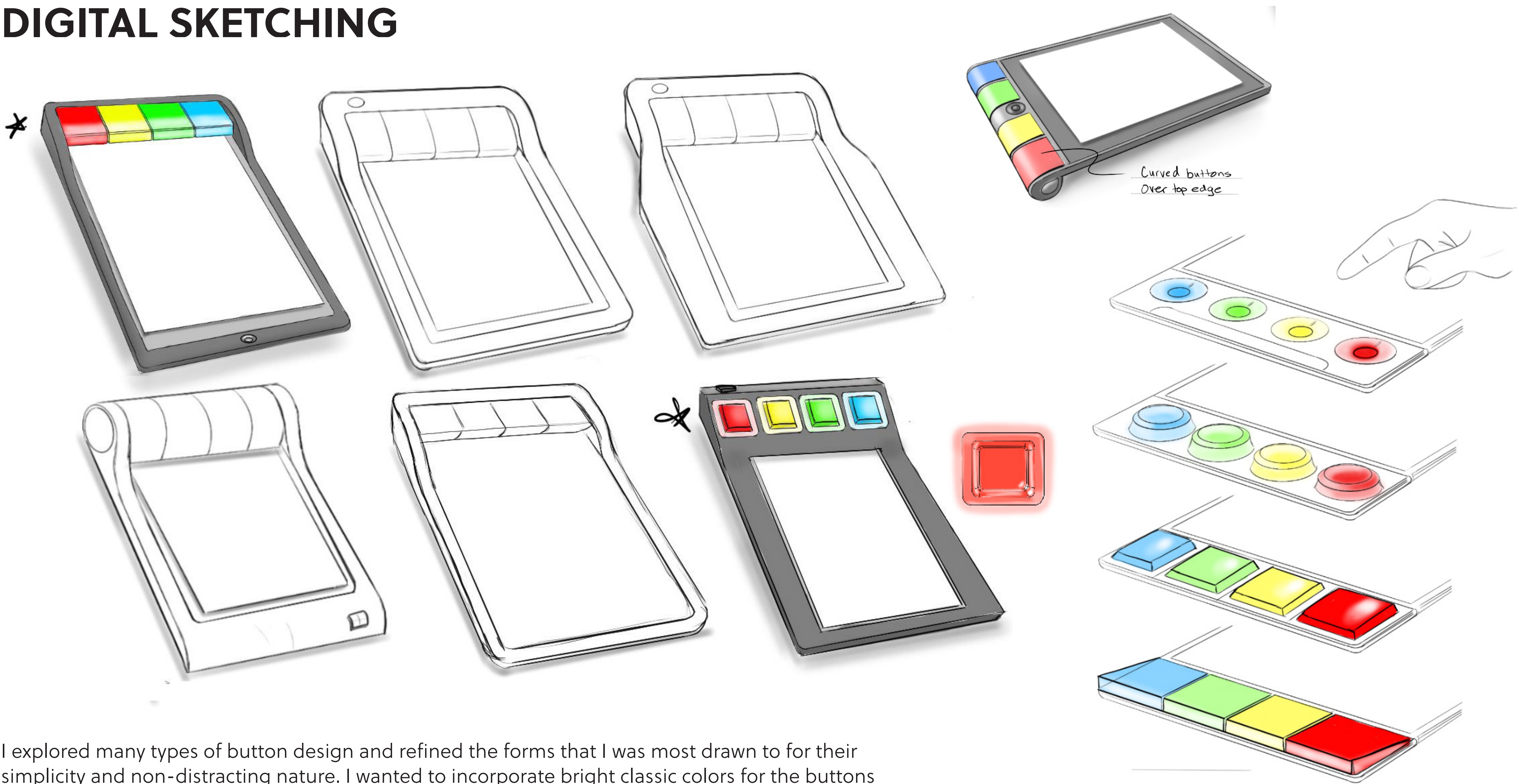
I explored many types of button design and refined the forms that I was most drawn to for their simplicity and non-distracting nature. I wanted to incorporate bright classic colors for the buttons and provide ample space around the borders for the child to rest their hand while writing.

PEN IDEATION SKETCHING

Although I wanted the smartpad to be able to sense/digitize the writing of any pen or pencil the student has in their home, I also was drawn to the idea of providing the student with a pen alongside the main product.

Not only does the pen need to fit in with the smartpad's aesthetic, but it also should encourage productive writing practices. I researched the proper way to hold a pen for young children learning how to write and started to ideate different forms that would promote this.

PROPER WAY TO HOLD A PEN

- 3 point grip
- thumb and forefinger grip pen, which is placed on the front part of the middle finger
- thumb and forefinger guide the pen
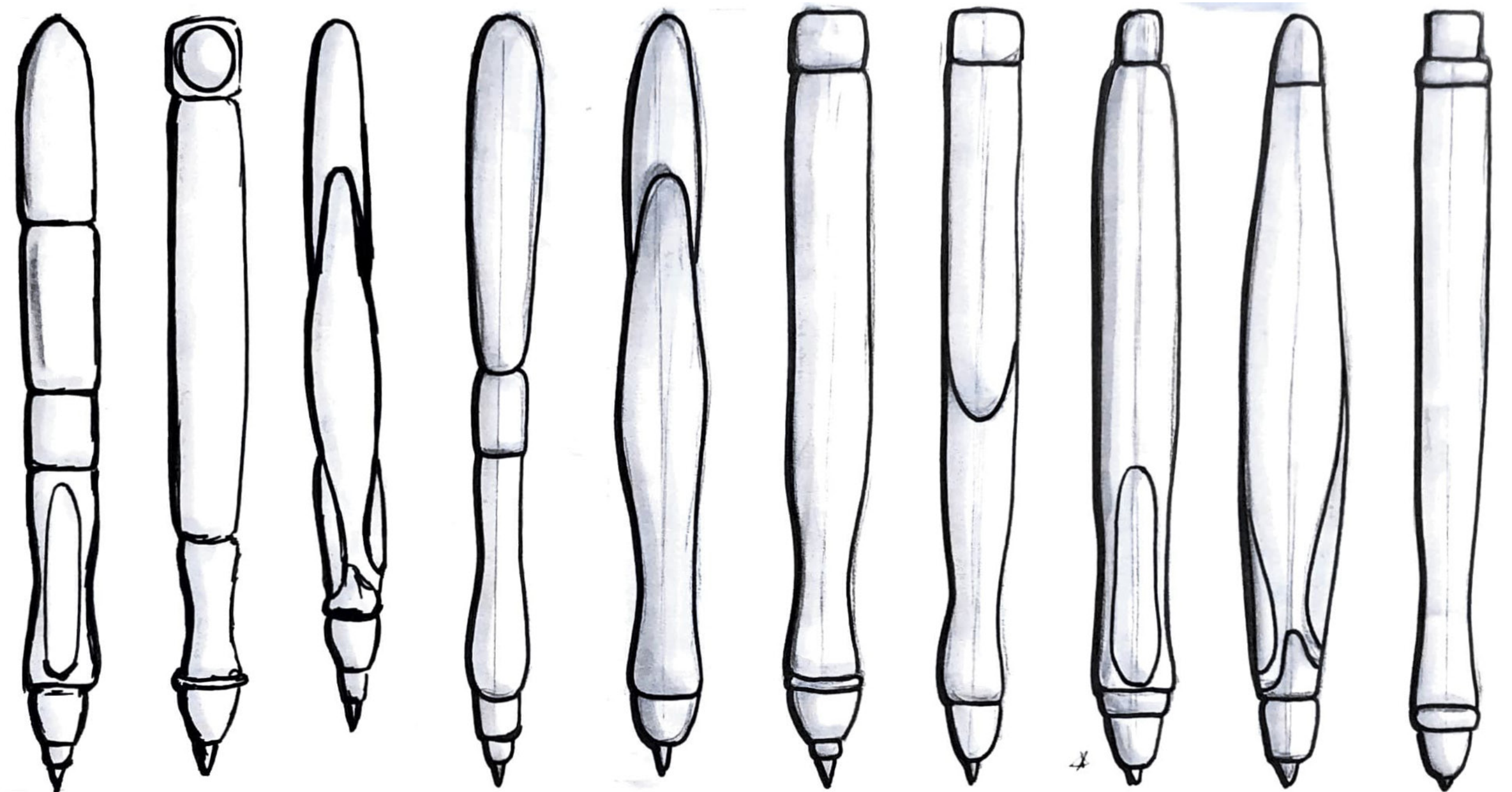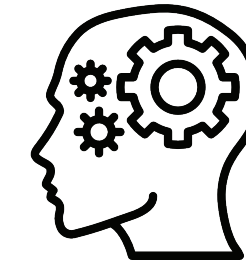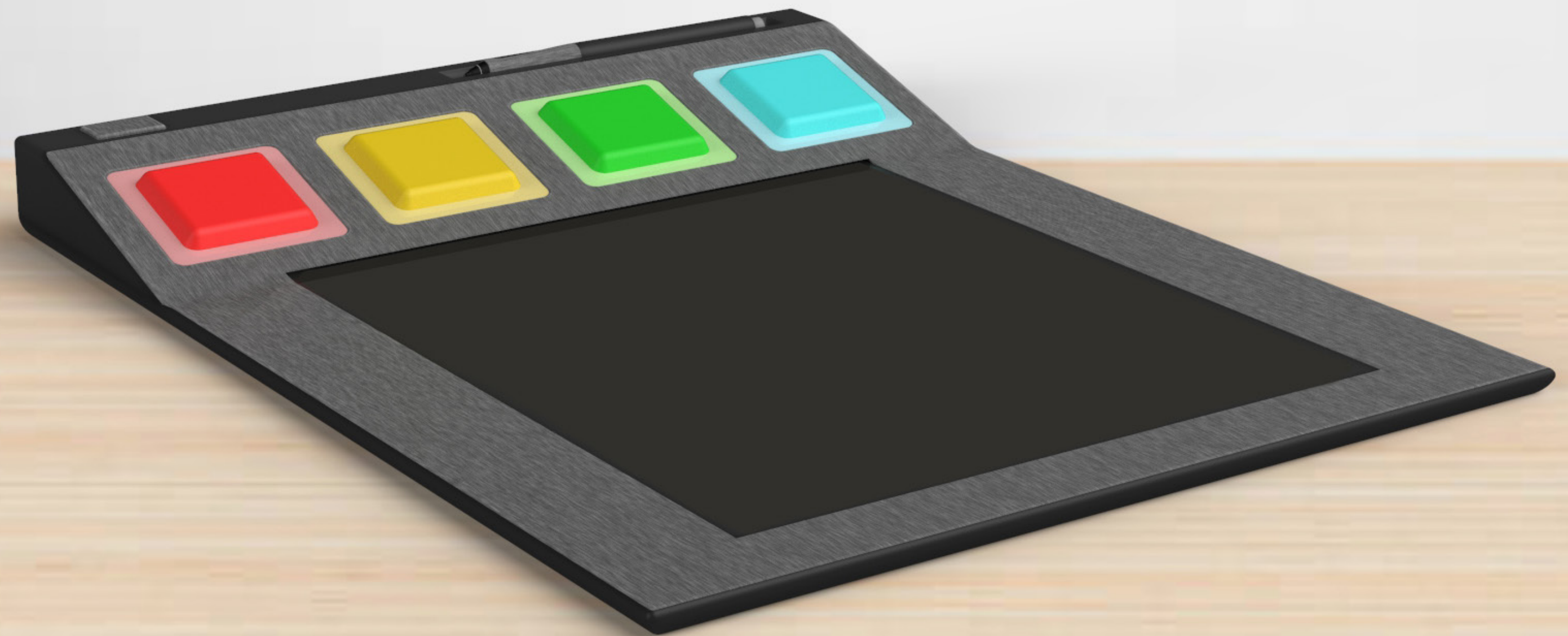
INSTANTANEOUS TRANSMISSION
FOR REAL-TIME FEEDBACK

The DigiCLIP system works by first being purchased by a school district and then being distributed to the students' homes. A student response is instantaneously transmitted from the smartpad to the child's device through Bluetooth or micro USB and then to the teachers device through internet connection.
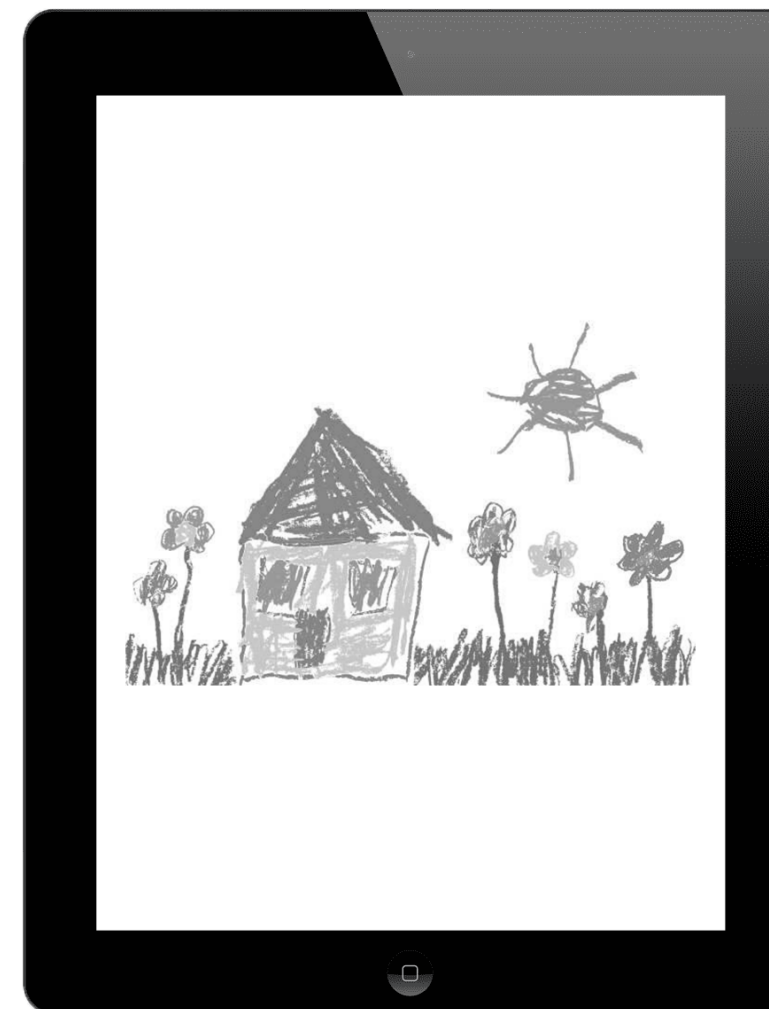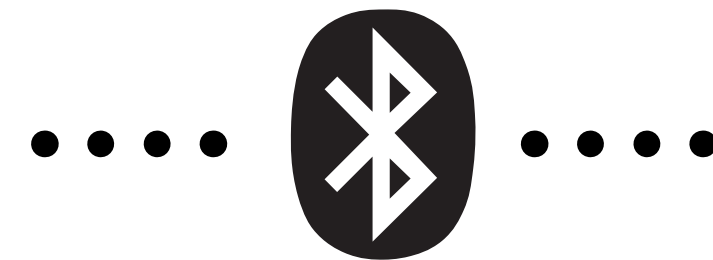
DigiCLIP Smartpad   **Child's device**   **Teacher's Device**

THE DIGICLIP SMARTPAD

Syncs to device to capture student engagement

Four buttons for multiple choice response with LED borders

0.05 inch tall slot to secure paper

Pen rest

Bluetooth pairing/submit answer button
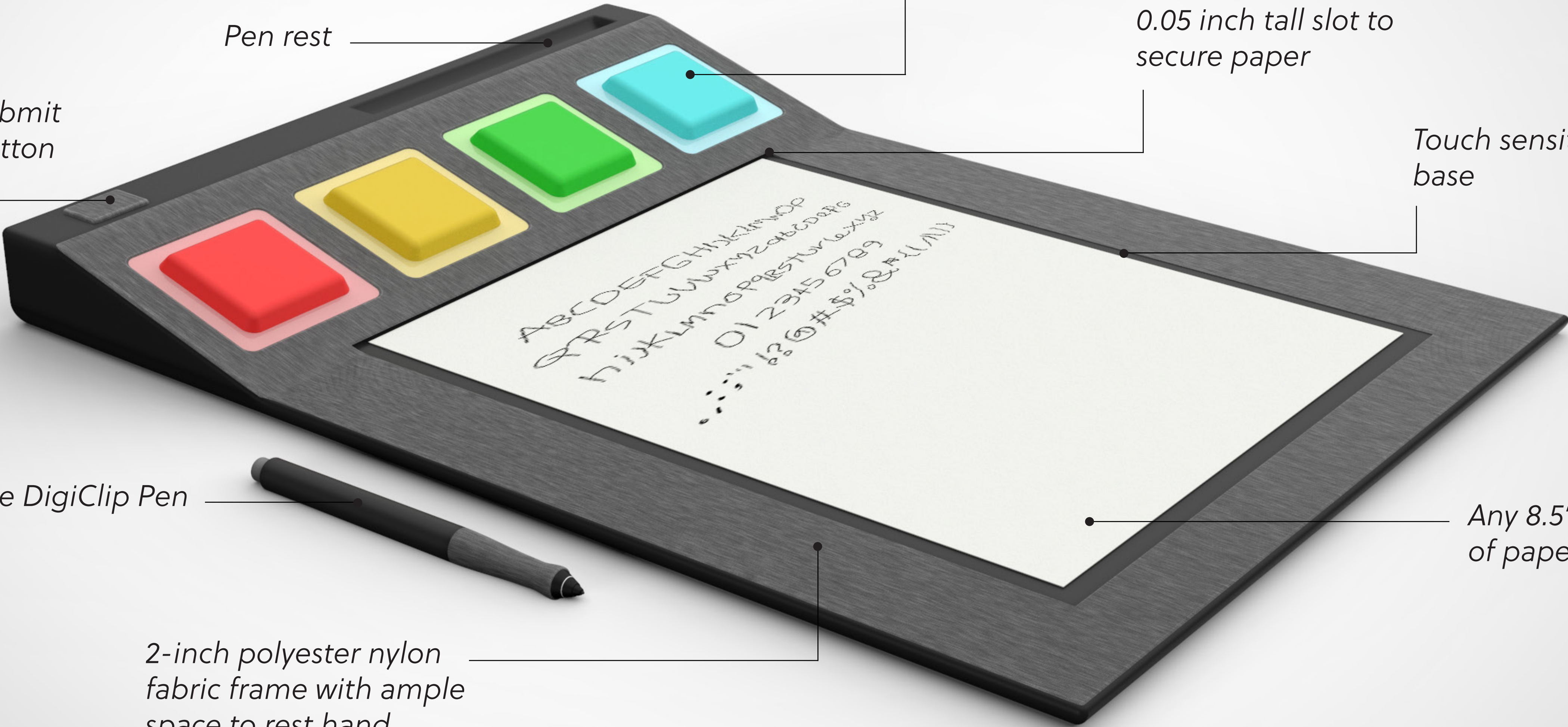
Touch sensitive base

The DigiClip Pen

Any 8.5"x11" piece of paper

2-inch polyester nylon fabric frame with ample space to rest hand

THE DIGICLIP PEN

Syncs to smartpad to capture student penmanship

The lightweight, 5-inch DigiClip pen is designed specifically for children learning how to write.

An angled grip intuitively encourages proper hand positioning while writing.

Top button

Soft plastic body

Touch sensor technology to sync with DigiClip board

Soft polyester nylon fabric grip

Soft plastic end cap

Replaceable ink

USER JOURNEY

Pre-Lesson Preparation   **1**

Response Moment Activated

Question Type Specified

Responses Gathered
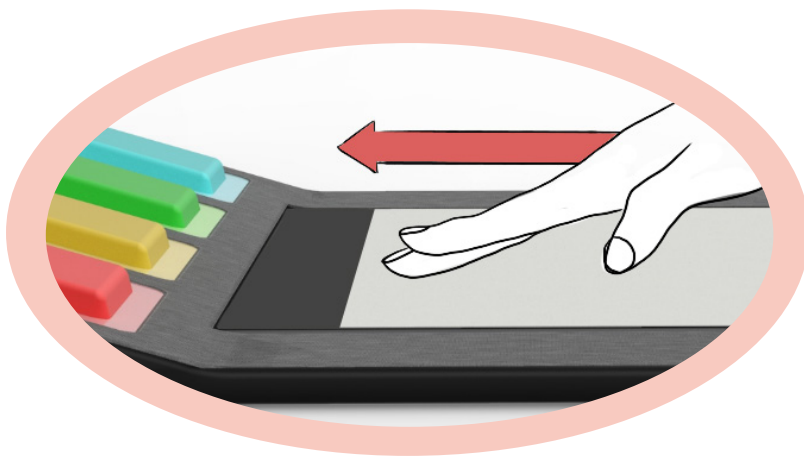
Response Moment Deactivated

Post-Lesson Analysis

Teacher

Mrs. Jones is a first grade teacher getting ready for her next virtual class with her students. She looks through her lesson plans and uses DigiClip's website to prepare questions that students will respond to throughout the lesson.

1

2

3

Student

Noah is a 1st grader getting his DigiClip ready for class. First, he slides a piece of paper under the slot below the buttons which locks it into place. Then, he holds down the top button to pair the device with his iPad. Once it is connected, he is ready to participate.
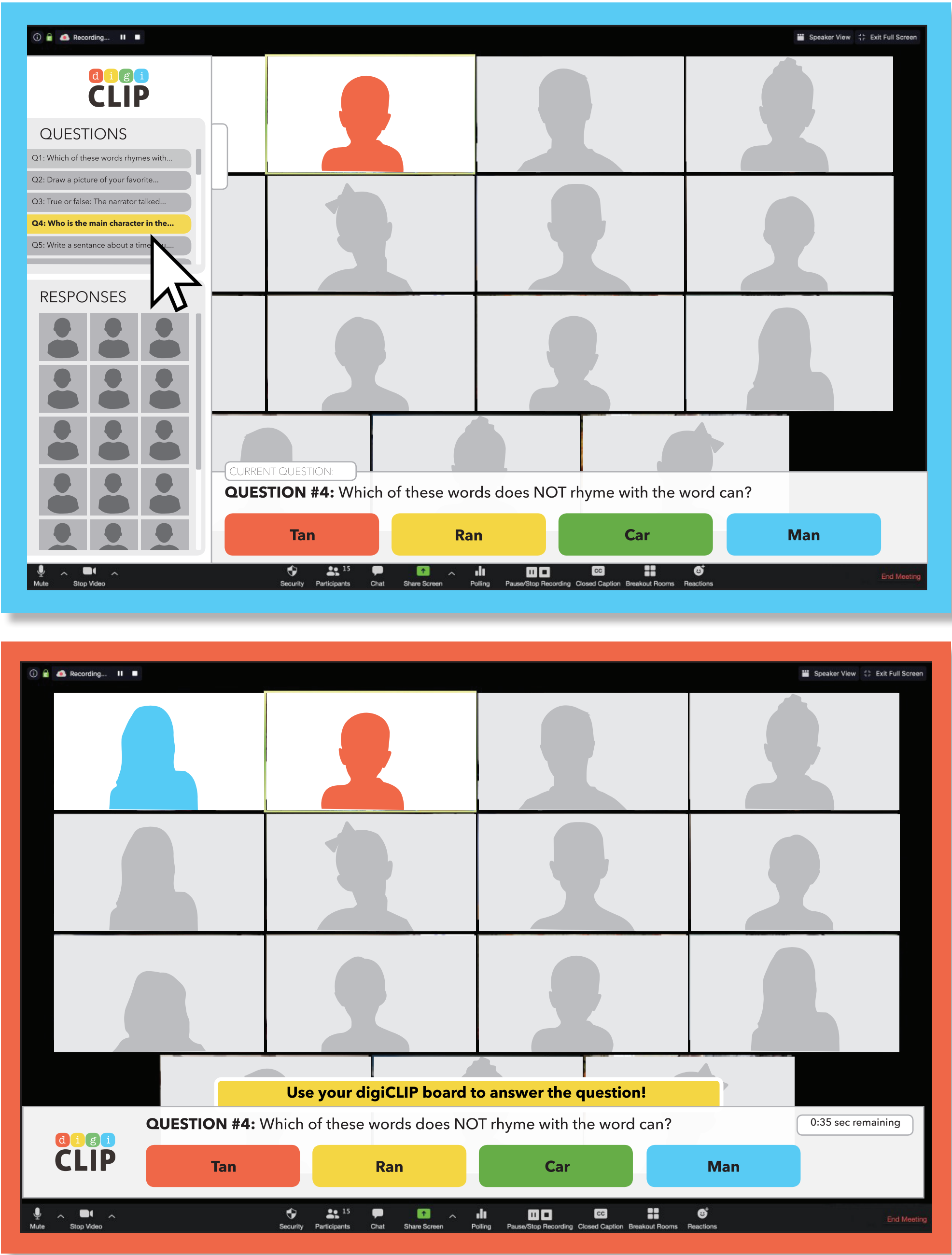
USER JOURNEY

Pre-Lesson
Preparation

**Response Moment
Activated** **2**

Question Type
Specified

Responses
Gathered

Response Moment
Deactivated

Post-Lesson
Analysis

Teacher

When Mrs. Jones reaches a point in her lesson where she wants to ask a question, she opens the DigiClip side tab and activates a "Response Moment." She can still see the student's faces and does not need to switch between tabs to do so.

Student

Noah is able to see the question Ms. Jones selected at the bottom of his screen. He does not need to switch between tabs either.

USER JOURNEY

This is a multiple choice question.
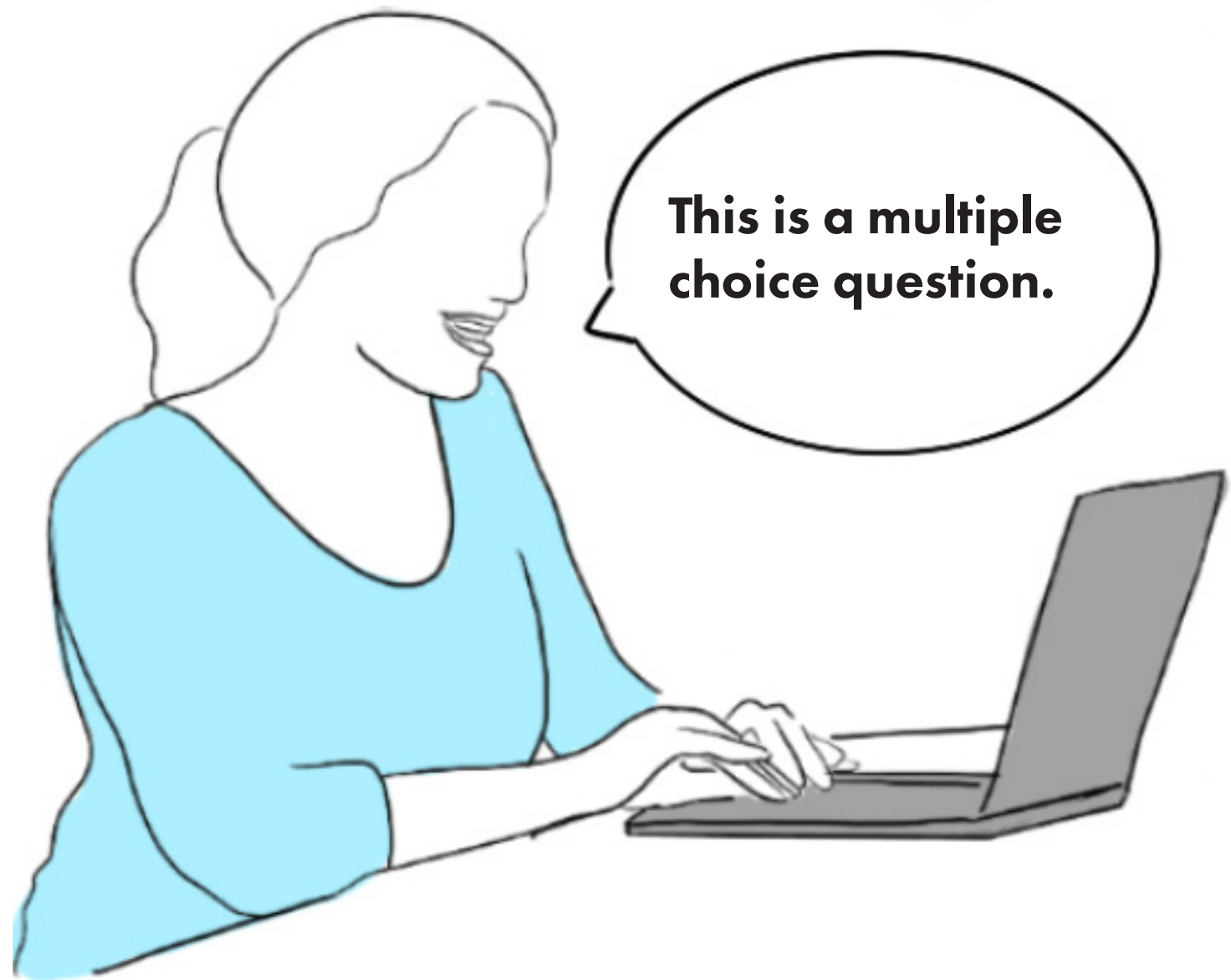
Teacher

Mrs. Jones verbally clarifies which type of question is being asked.

Student

Noah's DigiClip will light up in the area where he needs to respond. If it requires a multiple choice response, all buttons with light up. If it is a writing response, the touch sensitive base will light up.

USER JOURNEY

Pre-Lesson Preparation

Response Moment Activated

Question Type Specified

Responses Gathered   **4**

Response Moment Deactivated

Post-Lesson Analysis

Teacher

As the students respond, Mrs. Jones can see which students have answered and their accuracy.

Green = Correct
Red = Incorrect
Gray = No response yet

Student

In order for Noah to respond, he needs to:

1. Push the colored button that corresponds with his answer
2. Push the top button to "Submit" his answer to his teacher

USER JOURNEY
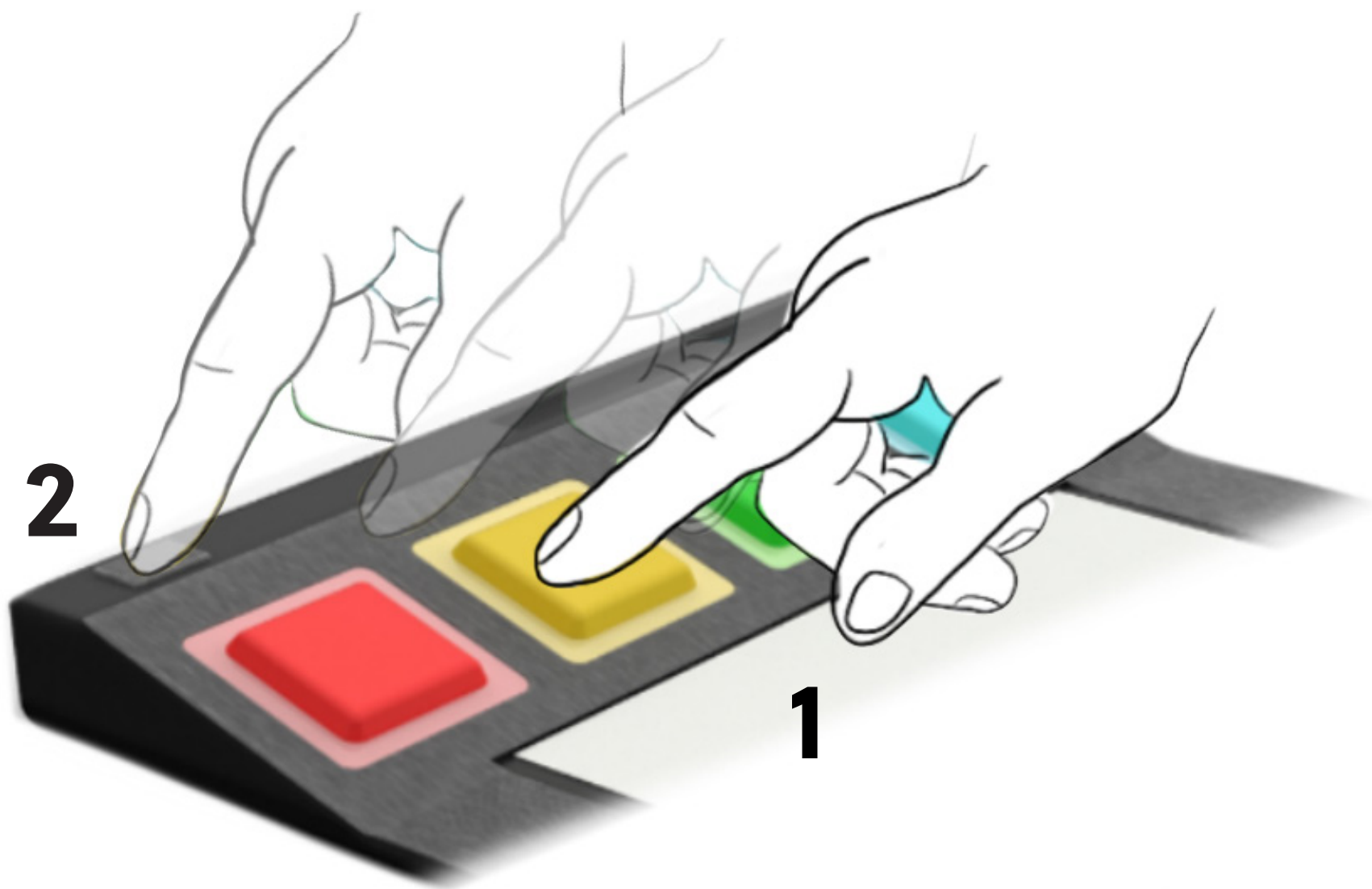
Pre-Lesson
Preparation

Response Moment
Activated

Question Type
Specified

Responses
Gathered

**Response Moment
Deactivated** 5

Repeat

Post-Lesson
Analysis

Teacher

Mrs. Jones can wait for the question timer to end or deactivate the Response Moment herself by clicking "End Question."

Student

Noah's DigiCLIP device stops glowing and he can no longer submit an answer.

USER JOURNEY

Pre-Lesson Preparation

Response Moment Activated

Question Type Specified

Responses Gathered

Response Moment Deactivated

Mrs. Jones' First Grade

digiCLIP

Home

Create Questions

Student Response

Class Performance

Settings

Individual Student Responses

Search

Anderson, Noah   **Status: Not at Risk**

	Week No.	Participation	Accuracy	Reaction Time	Attendance
Overview	1	Low	Okay	Low	100%
Writing	2	High	Okay	High	100%
Multiple Choice	3	High	Low	Okay	100%
	4	Okay	High	Okay	50%
	5	NA	NA	NA	NA

Bennett, Ava   **Status: At Risk**

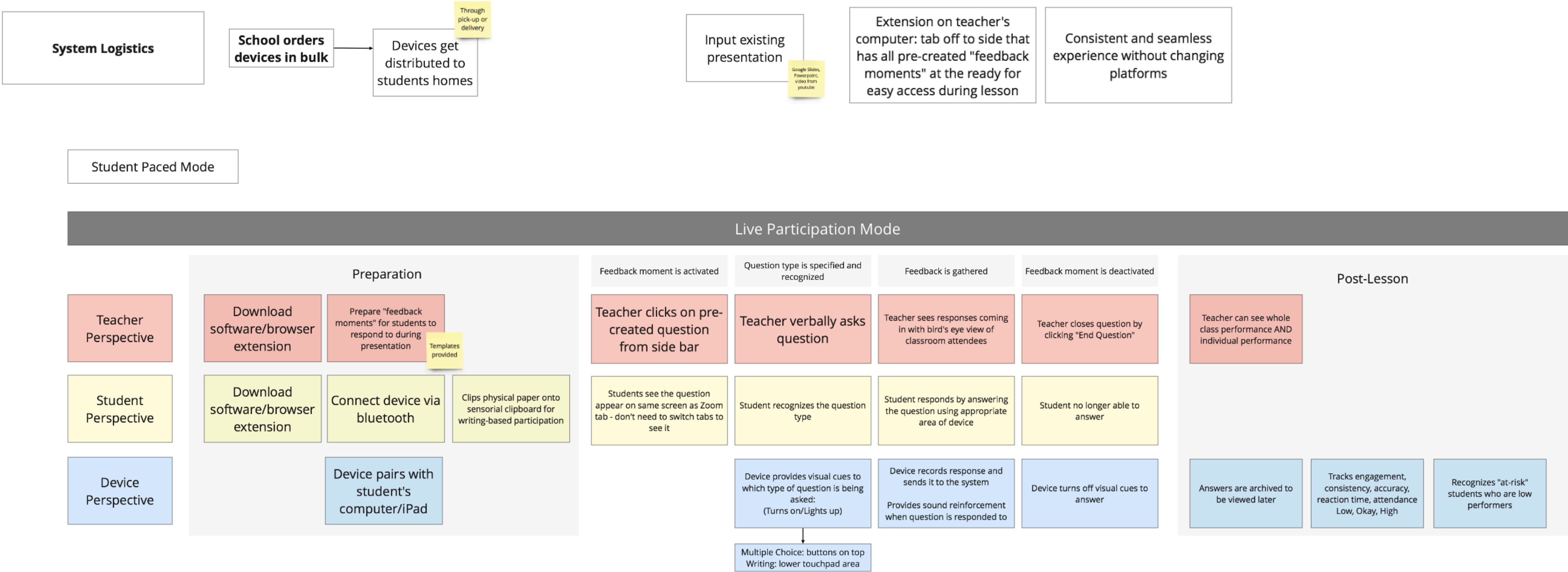| Week No.	Participation	Accuracy	Reaction Time	Attendance

Teacher

After the lesson, Mrs. Jones can login to the DigiCLIP website to assess her students' progress. She can also take note of "at risk" students who perform at lower levels.
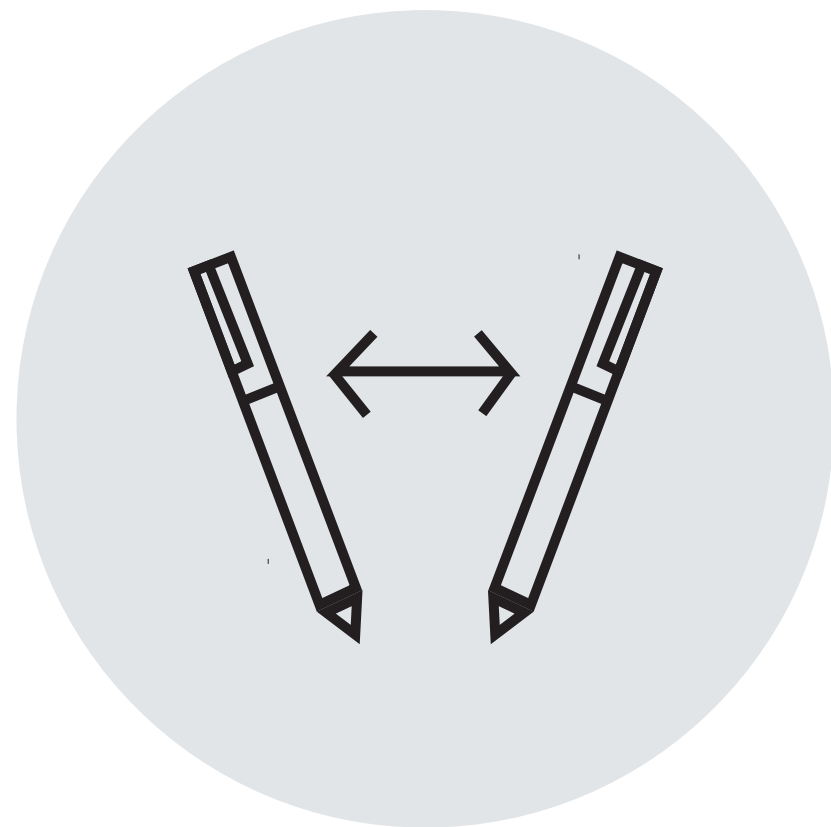
USER JOURNEY BREAKDOWN

Below is a further breakdown of the points of interaction from all three perspectives; the teacher, the student, and the DigiClip device. It is divided into the preparation phase, the in-class phase, and the post-lesson phase.
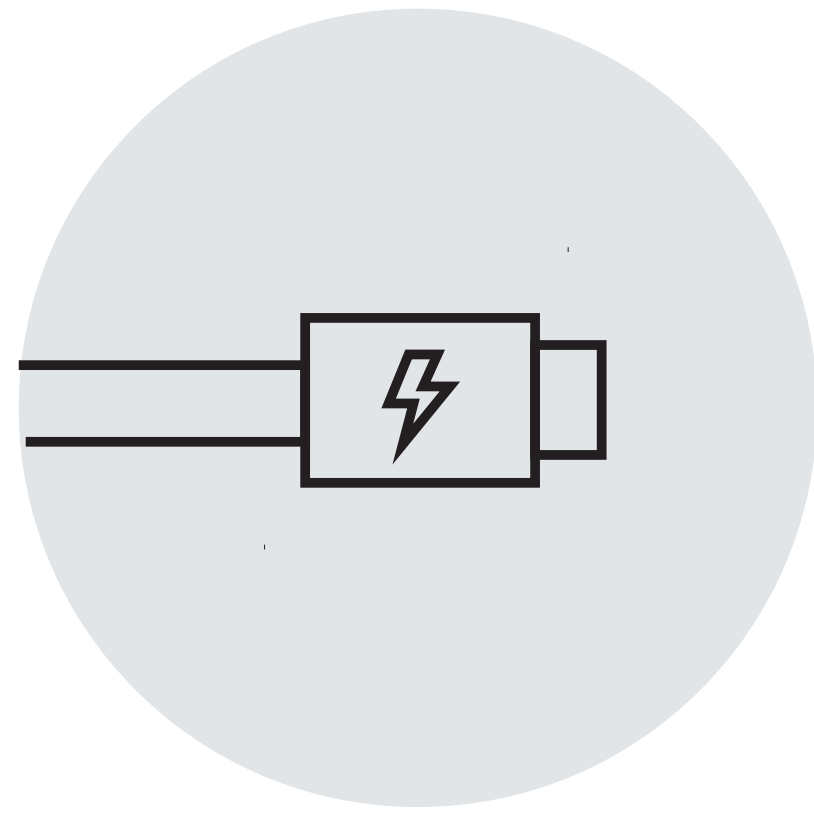

System Logistics

School orders devices in bulk → Devices get distributed to students homes *(Through pick-up or delivery)*

Input existing presentation *(Google Slides, Powerpoint, video from youtube)*

Extension on teacher's computer: tab off to side that has all pre-created "feedback moments" at the ready for easy access during lesson

Consistent and seamless experience without changing platforms

Student Paced Mode

Live Participation Mode

	Preparation			Feedback moment is activated	Question type is specified and recognized	Feedback is gathered	Feedback moment is deactivated	Post-Lesson		
Teacher Perspective	Download software/browser extension	Prepare "feedback moments" for students to respond to during presentation *(Templates provided)*		Teacher clicks on pre-created question from side bar	Teacher verbally asks question	Teacher sees responses coming in with bird's eye view of classroom attendees	Teacher closes question by clicking "End Question"	Teacher can see whole class performance AND individual performance		
Student Perspective	Download software/browser extension	Connect device via bluetooth	Clips physical paper onto sensorial clipboard for writing-based participation	Students see the question appear on same screen as Zoom tab - don't need to switch tabs to see it	Student recognizes the question type	Student responds by answering the question using appropriate area of device	Student no longer able to answer			
Device Perspective		Device pairs with student's computer/iPad			Device provides visual cues to which type of question is being asked: (Turns on/Lights up)	Device records response and sends it to the system Provides sound reinforcement when question is responded to	Device turns off visual cues to answer	Answers are archived to be viewed later	Tracks engagement, consistency, accuracy, reaction time, attendance Low, Okay, High	Recognizes "at-risk" students who are low performers

Multiple Choice: buttons on top
Writing: lower touchpad area

ADDITIONAL
FEATURES

Ergonomics
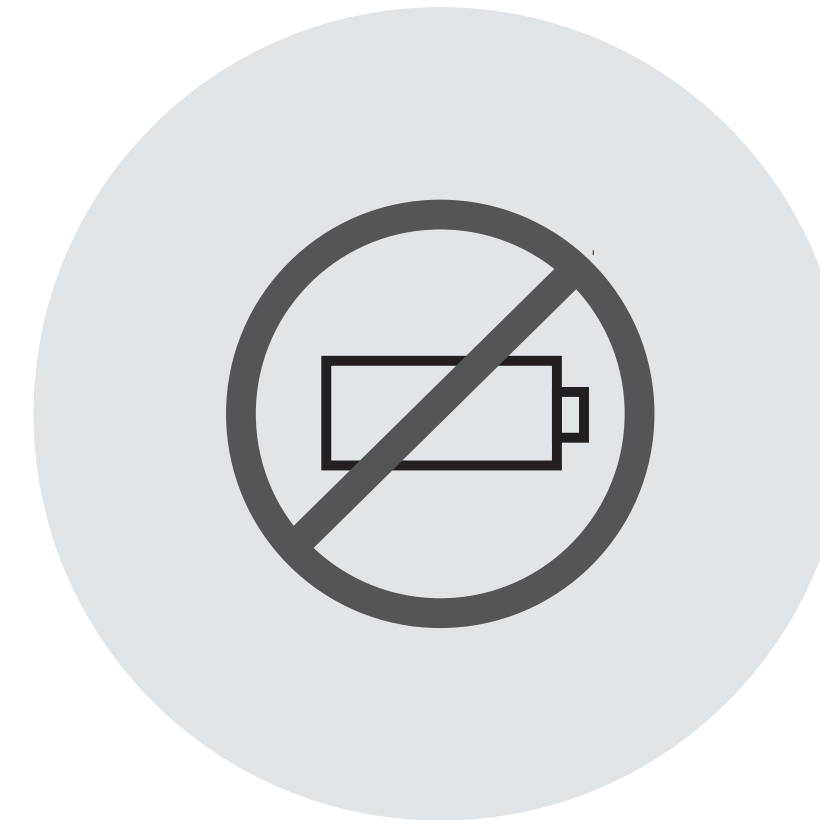Right or left handed use

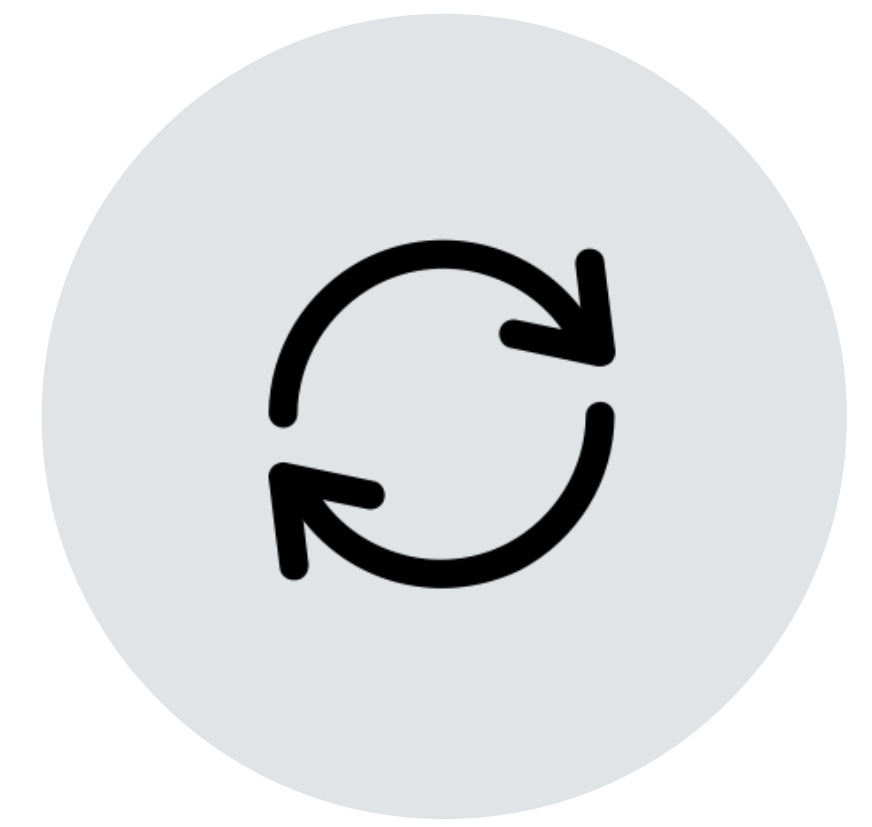**Connection**
Micro USB or Bluetooth

Compatibility
Works with any video
conferencing system

Battery Free Pen
No recharging

Refillable Materials
Ink refills provided

05

FUTURE IMPACT

PERSONAL REFLECTION

FUTURE IMPACT

While the virtual classroom will remain a large part of many students' lives, the DigiClip could work in many scenarios in a post-COVID-19 world.

Front of Class
Project the lesson and facilitate student engagement from their desks

Student-Paced
Allow students to use DigiClip to progress at their own pace.

PERSONAL
REFLECTION

The DigiClip Project is about making sure no student (or teacher) is left behind. First, it calls attention to the inspiring teachers who often make it their life mission to provide their students with an impactful education. Teachers do not get enough credit for the countless hours they put into their work outside the classroom. DigiClip helps reduce time spent evaluating students by providing a succinct breakdown of student feedback all in one place. Secondly, DigiClip levels the playing field for children in many different types of home environments. By providing a device to an entire community, every child would be able to utilize the same resource and disparities are less apparent. And finally, DigiClip serves as an example of how design thinking can intervene in education in the future. The education system is one that is often overlooked in terms of traditional industrial design. Being such an important aspect of humanity, education should be prioritized and could benefit so much from the guidance of innovative designers.

In terms of expanding on the project in the future, I look forward to building a physical prototype that actually works the way it is intended to. I would love to 3D print and program real buttons to light up and send feedback to a central system to replicate the real interaction between a student and teacher.

I would also love to expand into the user experience (UX) side of DigiClip's system and further design the interface that teachers and students would use in and outside of class time. This would include both a website and an extension to be able to work within any video conferencing system. While I focused my efforts on the product design during this semester, I believe there is a lot of learning to be had in terms of designing the digital components.

I believe this type of product has a huge amount of potential to improve the classroom environment both during and after the COVID-19 pandemic. It excites me that I was able to create something within a limited time-frame and utilize the vast amount of research I completed to make better design decisions. In the end, I believe the product is a simple, useful tool to help one small part of the problematic. I am grateful to have the experience and I look forward to future work in similar fields.

Thank you!